CLAIMS

What is claimed is:

1. A method for operating a synchronous space division multiple access, code division multiple access communications system, comprising:

within a coverage area of a base station (BS), assigning the same spreading code to a plurality of subscriber stations (SSs);

despreading a plurality of received signals; and

beamforming the plurality of despread received signals.

2. A method for operating a synchronous space division multiple access, code division multiple access communications system, comprising:

within a coverage area of a base station (BS), assigning the same spreading code to a plurality of subscriber stations (SSs);

despreading a plurality of received signals with a plurality of despreaders; and

spatial filtering the plurality of despread received signals, the step of spatial filtering using complex multiply operations performed at the symbol rate of the received signal.

3. A method as in claim 2, wherein an antenna array has M-elements (M>1), wherein individual ones of P orthogonal spreading codes are reused αM times within the coverage area, where $1/M<\alpha\leq 1$.

4. A method as in claim 2, wherein the step of spatial filtering comprises steps of operating the subscriber stations to obtain channel estimates comprised of the path amplitude and phase from each of *m* BS antenna elements and to send the *m* channel estimates back to the BS as a spatial signature vector, and where the BS, from the spatial signature vectors received from a plurality of same-code subscriber stations, computes antenna element weight vectors.

5. A method for operating a synchronous space division multiple access, code division multiple access communications system, comprising:

within a coverage area of a base station (BS), assigning the same spreading code to a plurality of subscriber stations (SSs);

for individuals ones of a plurality of same-code subscriber stations, spatially filtering a signal to be transmitted;

combining the outputs of a plurality of spatial filters to provide a combined signal to be transmitted; and

spreading the combined signal prior to transmitting the combined signal.

6. A method as in claim 5, wherein the antenna array has M-elements (M>1), wherein individual ones of P orthogonal spreading codes are reused αM times within the coverage area, where $1/M<\alpha\leq 1$.

7. A synchronous space division multiple access, code division multiple access communications system, comprising:

a unit for assigning the same spreading code to a plurality of subscriber stations (SSs) within a coverage area of a base station (BS);

a plurality of despreaders for despreading received signals from said plurality of subscriber stations; and

a beamformer coupled to outputs of said plurality of despreaders for beamforming the despread received signals.

8. A synchronous space division multiple access, code division multiple access communications system, comprising:

a unit for assigning the same spreading code to a plurality of subscriber stations (SSs)within a coverage area of a base station (BS);

a plurality of despreaders for despreading received signals from said plurality of subscriber stations; and

a plurality of spatial filters for spatially filtering the despread received signals using complex multiply operations performed at the symbol rate of the received signals.

9. A system as in claim 8, wherein an antenna array has M-elements (M>1), wherein individual ones of P orthogonal spreading codes are reused αM times within the coverage area, where $1/M<\alpha\leq 1$.

10. A system as in claim 8, wherein said subscriber stations operate to obtain channel estimates comprised of the path amplitude and phase from each of *m* BS antenna elements and to transmit the *m* channel estimates back to the BS as a spatial signature vector, said BS, from the spatial signature vectors received from a plurality of same-code subscriber stations, computing antenna element weight vectors.

11. A synchronous space division multiple access, code division multiple access communications system, comprising:

a unit for assigning the same spreading code to a plurality of subscriber stations (SSs) within a coverage area of a base station (BS);

a plurality of spatial filters for spatially filtering a signal to be transmitted to individual ones of a plurality of same-code subscriber stations;

a combiner for combining the outputs of the plurality of spatial filters to provide a combined signal to be transmitted; and

a spreader for spreading the combined signal prior to transmitting the combined signal.

12. A system as in claim 11, wherein an antenna array has M-elements (M>1), wherein individual ones of P orthogonal spreading codes are reused αM times within the coverage area, where $1/M<\alpha\leq 1$.